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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/825,875	04/03/2001	Sarath D. Gunapala	06816/035003/CIT 2426-C-C	4598

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EXAMINER

KANG, DONGHEE

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/825,875

Applicant(s)

GUNAPALA ET AL.

Examiner

Donghee Kang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 41,43-67,71-73 and 75-83 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 41 and 43-67 is/are rejected.
- 7) ☒ Claim(s) 71-73 and 75-83 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on April 03, 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: For example, numeral "450 & 452" on page 17 & "482, 473, & 471" on page 19 does not show in the Figure. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:
the numeral "402" & "408" in lines 10 and 13 & 16 on page 17, respectfully is misdescriptive. The Fig.4 shows vertical axis is 408 and quantum well is 405.
Appropriate correction is required.

Claim Objections

4. Claims 56 & 71 are objected to because of the following informalities: the preamble "a semiconductor comprising" is not clear because the semiconductor usually does not mean device but rather property of material. Examiner suggests "a semiconductor device" instead of semiconductor. Appropriate correction is required.

Double Patenting

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5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claim **41** is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,211,529.

Although the conflicting claims are not identical, they are not patentably distinct from each other. The instant claims obviously encompass the above mentioned patent and differ only in terminology.

7. Claims **43-48 & 51-67** are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 & 7 of U.S. Patent No. 6,211,529 in view of U.S. Patent No. 5,023,685.

Re Claims **43,45, 58, 59, 62 & 63**, claim 1 of '529 patent does not teach the device further comprising an element that adjust a direction of input radiation, relative to said quantum well elements. However, '685 patent teaches that the semiconductor device further comprising an element that adjusts a direction of input radiation, relative

to said quantum well elements (see Fig.1 & Col.3, lines 37-38) and a roughened surface can be used for coupling (Fig.6 & Col.4, lines 15-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have an adjustment element in '529 patent as taught by '685 patent in order to adjust the direction of input radiation hence increasing quantum efficiency.

Re Claims **44 & 61**, claim 1 of '529 patent does not teach the device further comprising electrical contact layers, including a first electrical contact layer on a first side of said quantum well elements, and a second electrical contact layer on a second side of said quantum well elements. However, '685 patent teaches the semiconductor device further comprising electrical contact layers (12 & 14, Fig.1) on a first side of said quantum well elements, and a second electrical contact layer on a second side of said quantum well elements. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the electrical contact layer in '529 patent in order to provide a voltage to a device hence operating the device properly.

Re Claims **46- 48, 51- 53 & 56**, claim 1 of '529 does not teach a device further comprising a plurality of image sensors, arranged in an array. '685 patent teaches the semiconductor device further comprising a plurality of image sensors, arranged in an array (Fig.6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have plurality imager sensor in order to obtain better quality image.

Re Claims **54, 57 & 66**, claim 1 of '529 patent does not teach the image sensor having a peak sensitivity in the infrared region. '685 patent teaches image sensors having a peak sensitivity in the infrared region (Fig.4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to detect infrared region in '529 patent since it has been held that a recitation with respect to the manner in which a claimed device is intended to be employed does not differentiate the claimed device from a prior art device satisfying the claimed structural limitations.

Re Claim **55**, claim 1 of '529 patent does not teach the well layer is formed of GaAs. '685 patent teaches the well layer is formed of GaAs (Col.5, line 3). It would have been obvious to one of ordinary skill in the art to form the well layer using GaAs taught by '685 patent, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Re claim **60**, neither claim 1 of '529 nor '685 teach the random reflectors are formed of gold or silver. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the random reflector, having the material claimed, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Re Claim **64**, claim1 of '529 patent does not teach there are 50 of said quantum well structures in each of said quantum well stacks. '685 patent teaches that there are 50 of said quantum well structure in each of said quantum well stacks (Col.6, lines 22-

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23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have 50 of quantum well in '529 patent as taught by '685 patent, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re Claims **65 & 67**, claim 1 of '529 patent does not teach the well layers are formed of GaAs and said barrier layers are formed of AlGaAs. '685 patent teaches the well layers are formed of GaAs and the barrier layers are formed of AlGaAs (Col.5, lines 1-5).

Thus, it would have been obvious to one of ordinary skill in the art to form the well and barrier layers using GaAs & ALGaAs taught by '685 patent, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

8. Claims **49-50** are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,211,529 in view of 5,023,685 and further in view of Kozlowski (Electron Device, Vol.38 (5), May 1991).

Neither claim 1 of '529 nor '685 patent teach a plurality of bumps, connecting between said quantum well stacks and said image sensor, wherein said image sensor are CMOS image sensor. However, Kozlowski in Flg.10 teaches indium bump is formed

between detector array and Si readout circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form indium bump in order to provide an interconnection between detector array and Si readout circuit.

Allowable Subject Matter

9. Claims 71-73 and 75-83 would be allowable if rewritten or amended to overcome the objection, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter:

Prior art reference, taken along or in combination, do not teach or render obvious that the semiconductor device comprising well layers and barrier layers, wherein each well is supporting an unexcited energy state within said well and a bound excited energy state for photo carriers, each of said well layers is selected such that the bound excited energy state is resonant with a top portion of the well and said barrier layers has a greater than 300 microns in width.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Donghee Kang
Examiner
Art Unit 2811

dhk
July 23, 2003